TR-168

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TECHNICAL REPORT

MARINE MAGNETIC SURVEYS IN THE NORTHWEST PACIFIC OCEAN

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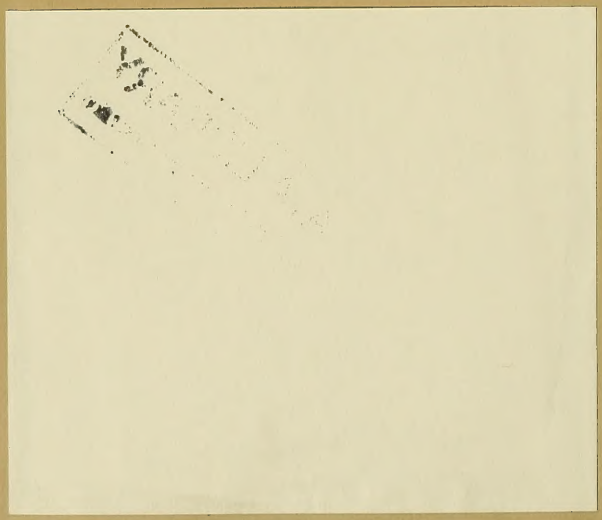
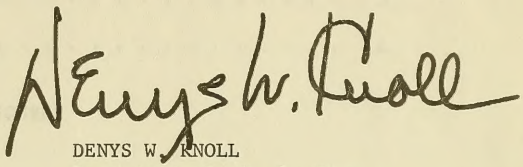
ABSTRACT

A geomagnetic and bathymetric survey of two adjacent areas off the east coast of the Kamchatka Peninsula has shown steep, high amplitude magnetic anomalies occurring on or near the edge of the continental shelf.



FOREWORD

The geophysical data presented in this report were collected in an area of complex crustal features. Measurements of this type provide basic information for further interpretation of the structural character of oceanic areas.



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Commander

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I. INTRODUCTION

A survey of two adjacent areas east of the Kamchatka Peninsula was conducted by USS REHOBOTH (AGS-50) between June and September 1962. Location of the survey areas is shown in figure 1.

The survey of these areas was part of NAVOCEANO Project 0-162, a general investigation of geomagnetic, oceanographic, and bathymetric properties in the North Pacific Ocean. The geomagnetics phase of this survey was conducted as part of an overall geophysical program to improve accuracy of magnetic data on charts, and to provide information on underlying oceanic crustal features.

Although this report deals primarily with the results of the geomagnetic investigations, bathymetric data are included for correlation with the magnetic data and to aid in geologic interpretations.

II. SURVEY OPERATIONS

A. Conduct of Survey.

Tracks in survey area "A" (figure 2) were generally run in an east-west direction normal to the coast of the Kamchatka Peninsula. Line spacing is approximately 7 miles in the southern part of the area, and approximately 20 miles in the northern part. Area coverage is most complete in the center of the area.

In survey area "B" (figure 3), tracks are generally oriented in a northwest-southeast direction with a line spacing of about

5 miles. Average ship's speed in the two survey areas was 12 knots.

Control in the survey areas was maintained when possible by radar and visual fixes obtained at one hour time intervals. Fix accuracy during these periods is estimated as being approximately one mile. When out of visual and radar range of land, position was maintained by celestial navigation and dead reckoning. Fix accuracy is reduced during these periods to an estimated $\pm$ 5 miles.

B. Instrumentation.

Total magnetic intensity measurements were made with a Varian marine proton precession magnetometer, model V-4931. The sensor unit for this magnetometer was contained in a cylinder 24 inches long and 6 inches in diameter. This sensor was towed 575 feet astern in order to reduce the effect of the ship's magnetic field.

Because of equipment design, magnetic data were recorded as "magnetometer counts," a unit of measurement inversely related to the magnetic field intensity. These units were recorded on a Varian model G-11A analog recorder and printed out in digital form on a Hewlett-Packard digital recorder, model 560-A.

Bathymetric data were obtained with a Precision Depth Recorder (MK-V) and an AN/UQN 1-D sonar sounding set.

III. DATA PROCESSING

The magnetic data from the analog tapes were scaled and converted from magnetometer counts to absolute values in gammas (1 gamma = 1×10^{-5} oersted) by the use of a template. These data were used to construct magnetic total intensity contour charts on Mercator Projections at a contour interval of 50 gammas (figures 4 and 6).

Bathymetric contour charts were constructed on the same projection using a contour interval of 100 fathoms (figures 5 and 7).

No corrections were made to any of the magnetic data for temporal variations of the earth's magnetic field.

Because geomagnetic and bathymetric data were collected simultaneously in the two survey areas, bathymetric and magnetic charts may be used for direct comparison of the data. No sound velocity or other corrections have been made to the bathymetric data.

IV. SURVEY RESULTS

Survey areas "A" and "B" (figure 1) have a total combined area of 32,500 square nautical miles. The larger area, "A", lying east of the Kamchatka Peninsula, contains 25,900 square nautical miles. The smaller area, "B", adjoining the southwest corner of "A", contains 6,600 square nautical miles.

The area "A" total magnetic intensity contour chart (figure 4) shows broad magnetic anomalies associated with the bathymetric features (figure 5) east of an imaginary diagonal line drawn from latitute 53°N.; longitude 160°10'E. to latitude 56°N.; longitude 163°30'E. West of this line the anomalies become very steep with relatively high amplitudes. These anomalies occur on or near the edge of the continental shelf where the slope drops sharply down to 1500-2000 fathoms. The steep anomalies end abruptly south of Cape Kroznotzky then reappear to the north of the cape.

The area "B" total magnetic intensity contour chart (figure 6) shows another high amplitude magnetic anomaly. This anomaly is also located at the edge of the continental shelf (figure 7), and west of the southeastward extension of the line mentioned in area "A." A magnetic anomaly on the extreme eastern edge of area "B" corresponds very closely to a small bathymetric trough at the same location.

V. SUMMARY OF FINDINGS

This survey has shown the presence of steep, high amplitude magnetic anomalies near the edge of the continental shelf off the east coast of Kamchatka. These high amplitude anomalies end abruptly south of Cape Kroznotzky then reappear to the north of the Cape. West of the continental shelf, over the deeper ocean basin, the magnetic anomalies broaden. These broad anomalies seem to be associated with the bottom topographic features.

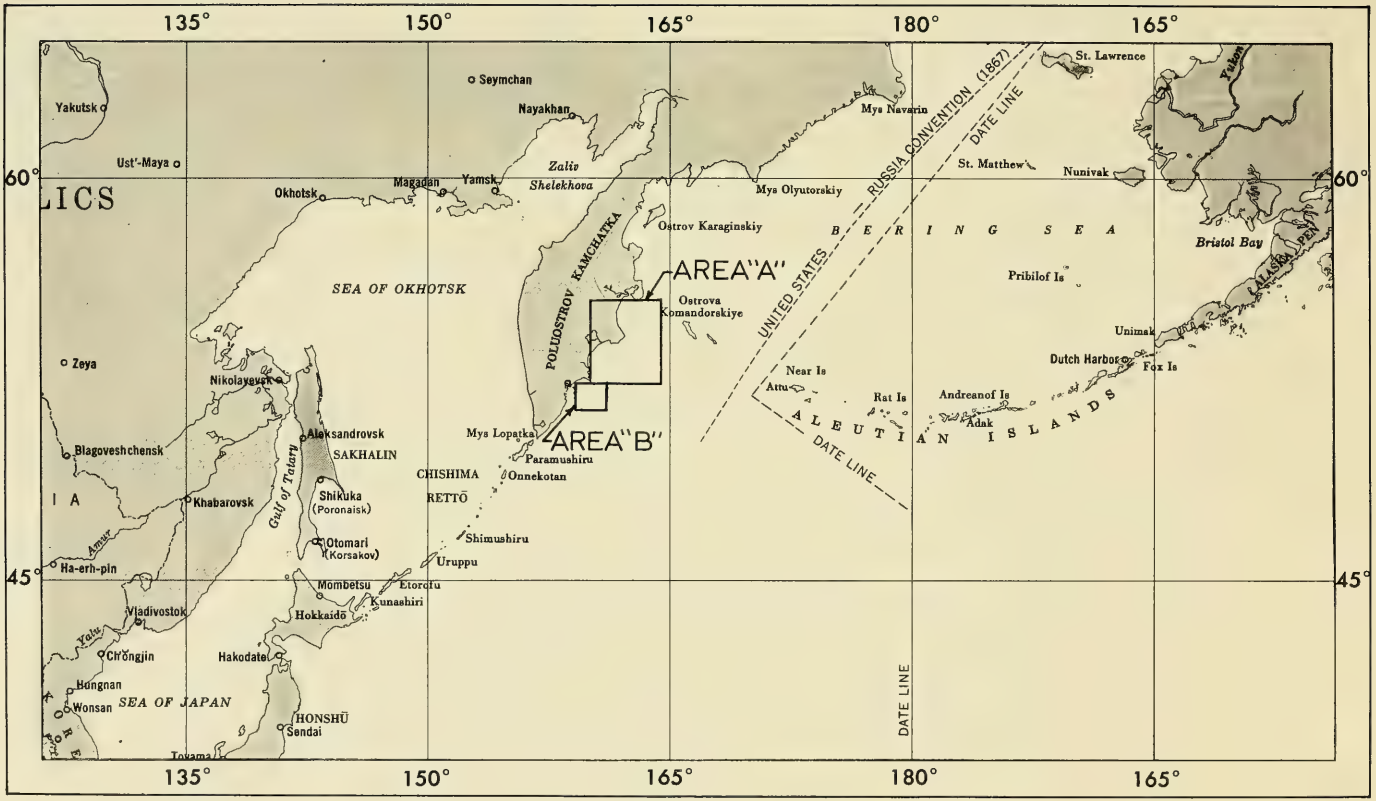

FIGURE 1.—NORTH PACIFIC SURVEY—1962 AREAS "A" AND "B" LOCATION CHART

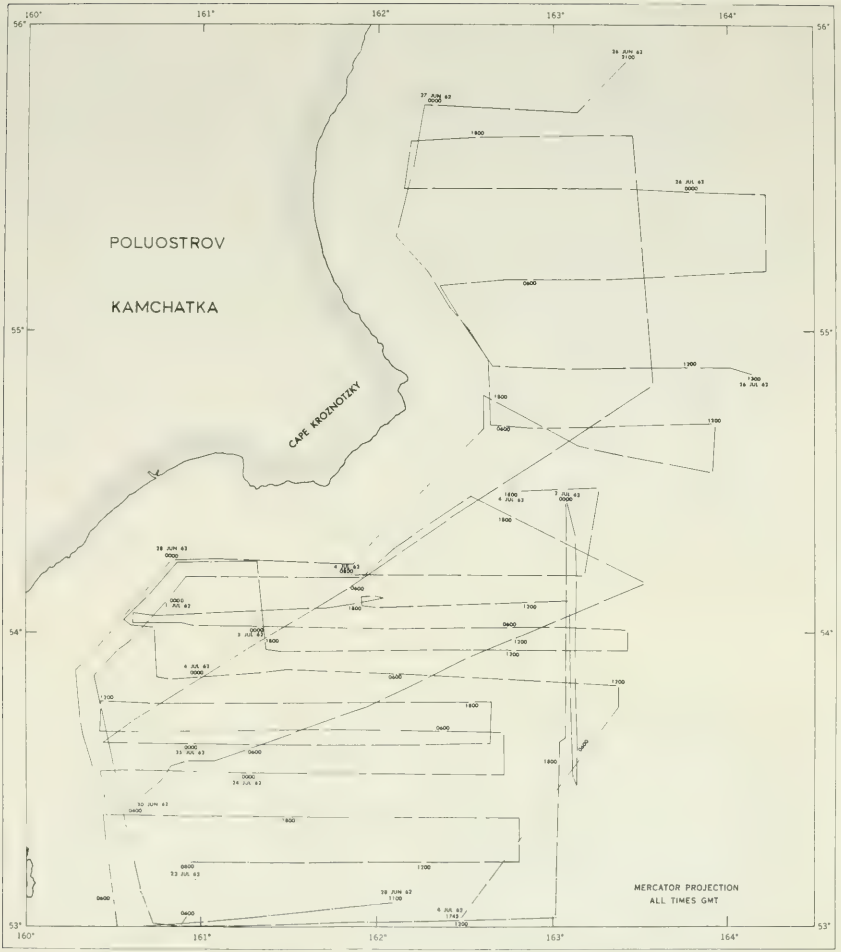

FIGURE 2.—NORTH PACIFIC SURVEY-1962 AREA "A" SURVEY TRACK CHART

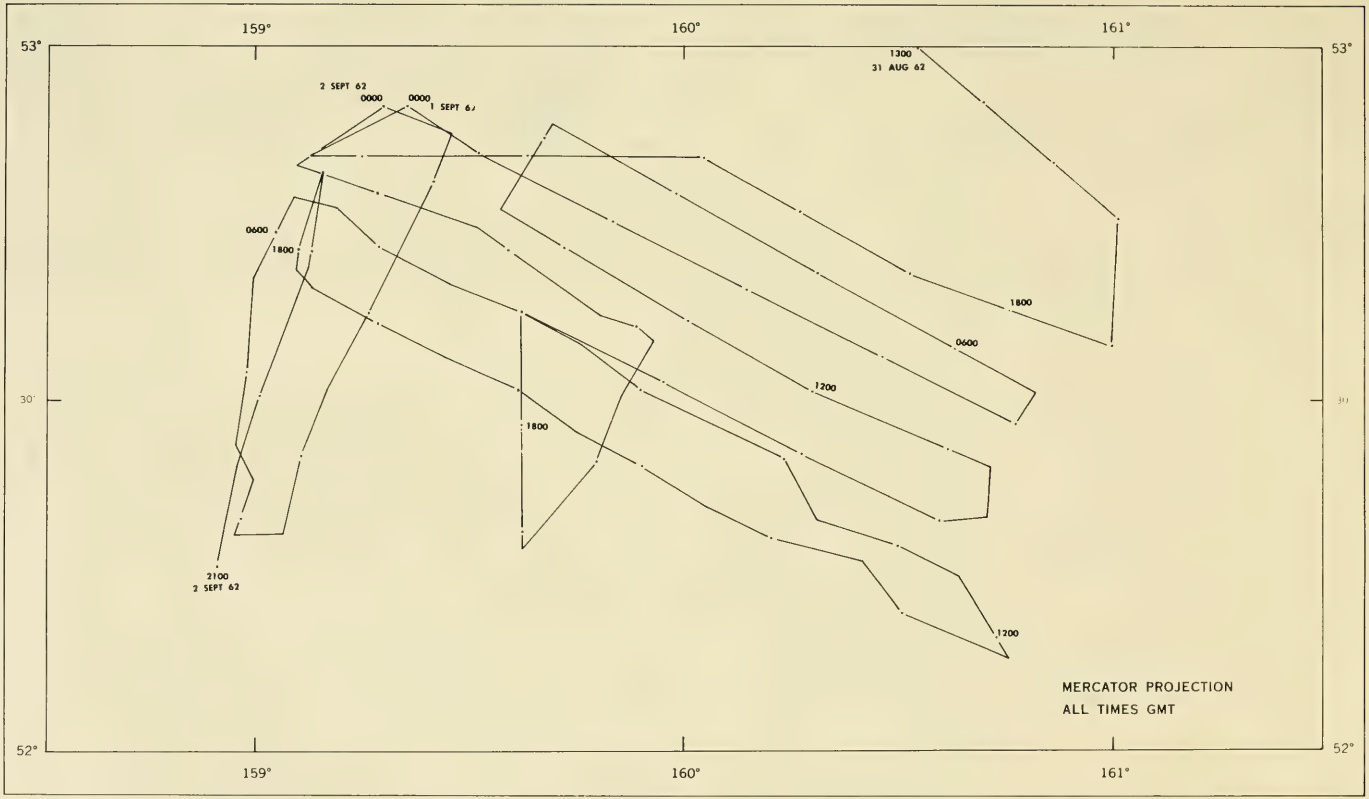

FIGURE 3.—NORTH PACIFIC SURVEY-1962 AREA "B" SURVEY TRACK CHART

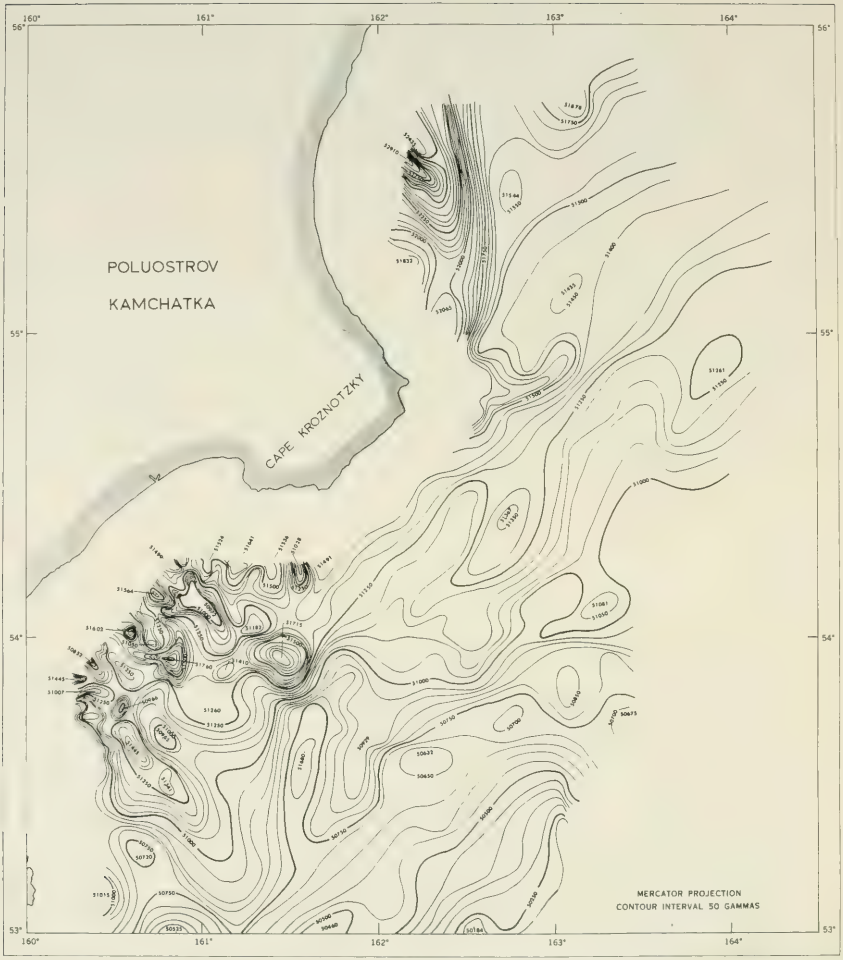

FIGURE 4.—NORTH PACIFIC SURVEY-1962 AREA "A" TOTAL MAGNETIC INTENSITY CONTOUR CHART

FIGURE 5.—NORTH PACIFIC SURVEY-1962 AREA "A" BATHYMETRIC CONTOUR CHART

FIGURE 6.—NORTH PACIFIC SURVEY -1962 AREA "B" TOTAL MAGNETIC INTENSITY CONTOUR CHART

FIGURE 7.—NORTH PACIFIC SURVEY-1962 AREA "B" BATHYMETRIC CONTOUR CHART

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